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U.S. Department of Energy Radiological and Environmental Sciences Laboratory

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March 29, 2012

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
29 MAR 2012		**00-00-2012 to 00-00-2012**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
U.S. Department of Energy Radiological and Environmental Sciences Laboratory	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Department of Energy,Idaho Operations Office,1955 Fremont Ave,Idaho Falls,ID,83415**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
Presented at the 9th Annual DoD Environmental Monitoring and Data Quality (EDMQ) Workshop Held 26-29 March 2012 in La Jolla, CA.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**26**	

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TODAY'S TOPICS

- Overview of the Radiological & Environmental Sciences Laboratory (RESL)
- Programs at RESL
- Core capabilities at RESL
- What RESL can offer the DOD Environmental Laboratory Accreditation Program (ELAP)

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MISSION: A Reference Laboratory for the U.S. Department of Energy

- Provide federal agencies & programs confidence in laboratory results supporting protection of workers, the public and the environment
  - Assurance of quality of Measurement
  - Traceability
  - Independence
- RESL adds a defensible decision making component to the management and oversight of federal operations
- Performance based evaluation of laboratories with real world samples and matrices

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RESL's Core Mission Capabilities

- Expertise in analytical measurements for radiological, inorganic and organic analyses
- Radiation measurements and calibrations
- Applied programmatic R&D
  - −Development of new PE materials
  - −Development of new analytical methods
  - −Technical assistance
- Development of DOE and National Standards

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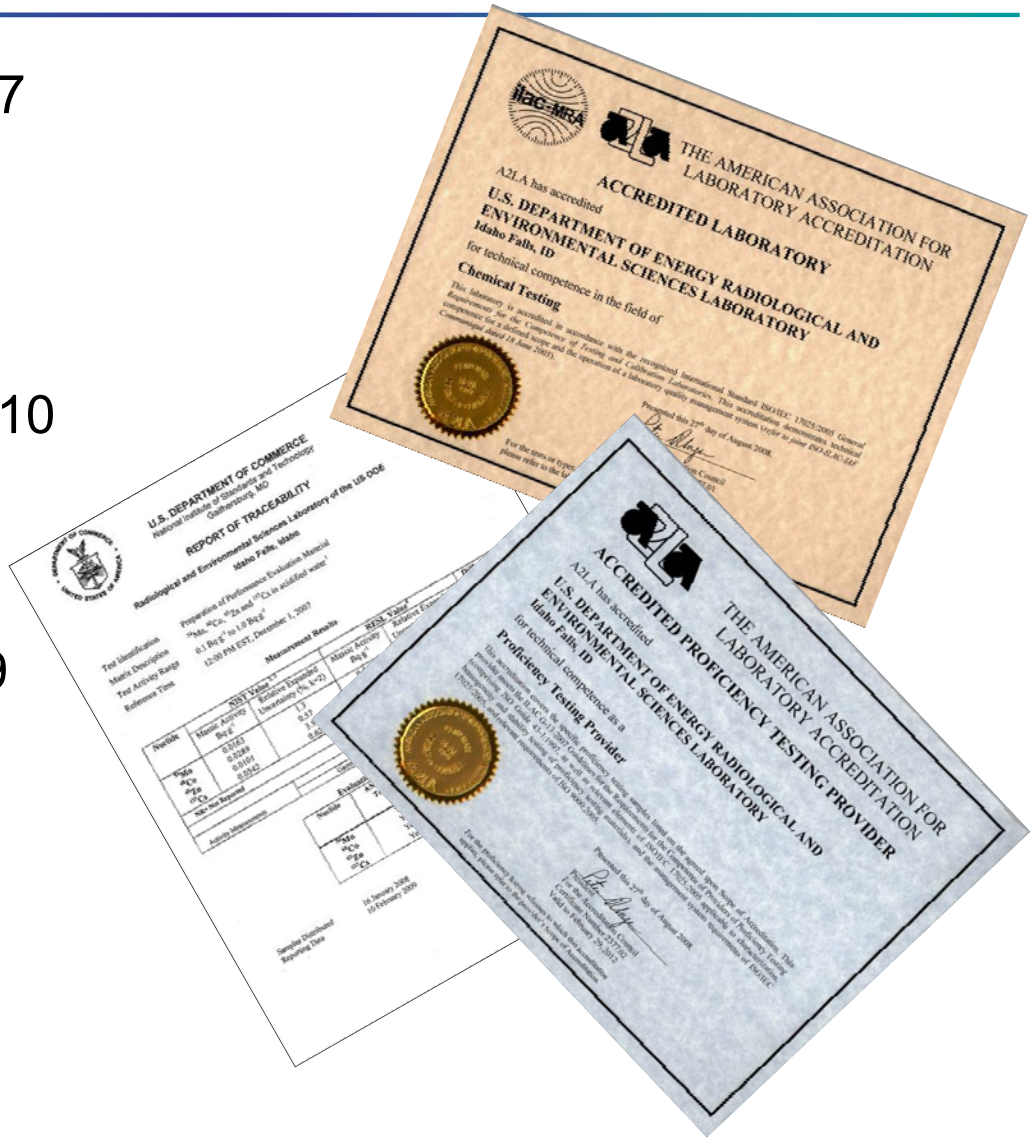
RESL – Established Quality Systems

Accredited to ISO/IEC-7025:2007
- ISO Quality Standard for Laboratory Operations & External Dosimetry

Accredited to ISO/IEC-17043:2010
- General Requirements for Proficiency Testing

Accredited to ISO/IEC-G34:2009
- General Requirements for Certified Reference Material Provider

NIST/RESL Radiological
- Traceability Program



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RESL Programs

Program Secretarial Office – Nuclear Energy

- RTP: NIST Radiological Traceability Program
- DOELAP: DOE Laboratory Accreditation Program
- RMAP: Radiological Measurement Assurance Program
- MAPEP: Mixed Analyte Performance Evaluation Program
- SSPEP: Site-Specific Performance Evaluation Program and Other Specialized Programs

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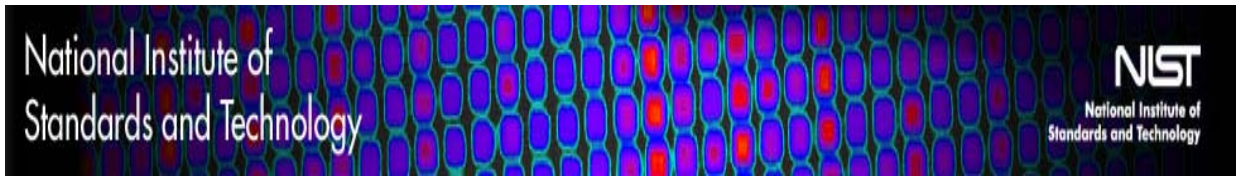
Radiological Traceability Program (RTP)

Direct Traceability to NIST

- ✓ RESL prepares PE Materials for confirmatory measurements by NIST
- ✓ RESL analyzes PE Materials prepared by NIST
- ✓ All Matrices are addressed

No other Federal Agency or Commercial Facility maintains this type of direct traceability to NIST



Evaluates ability of DOE sites to accurately measure radiation dose to workers

RESL designed, developed and has administered the DOELAP performance testing program for over 25 years

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DOELAP Features

External Dosimetry – TLD badges

Internal Dosimetry – Radiobioassay

- Wholebody / Lung / Thyroid Phantoms &
- Urine / Fecal Samples
  - Actinide, fission, & activation products
  - Unique isotopic activities for each sample matrix
  - Chemical and radiochemical interferences are chosen to mimic real world samples
  - Reference values are directly traceable to NIST

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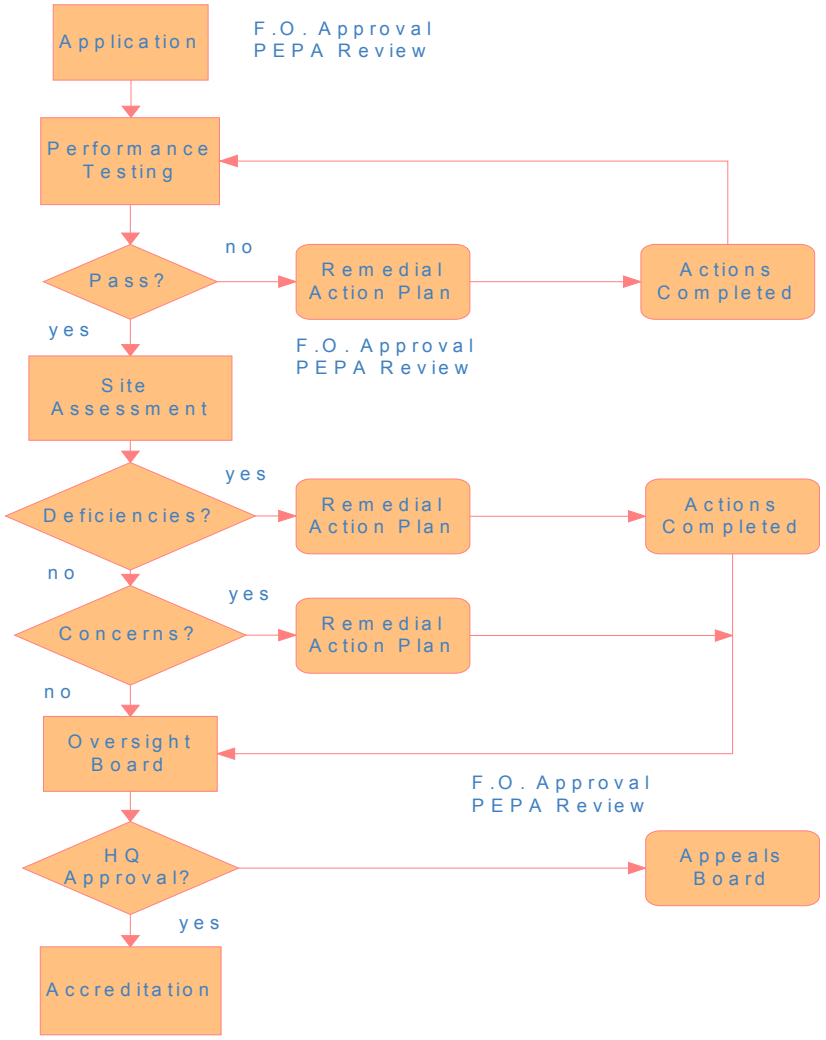
U.S. Department of Energy Laboratory Accreditation Process

- Application
- Performance Testing
- Assessment
- Corrective Action
- Oversight Board
- Accreditation



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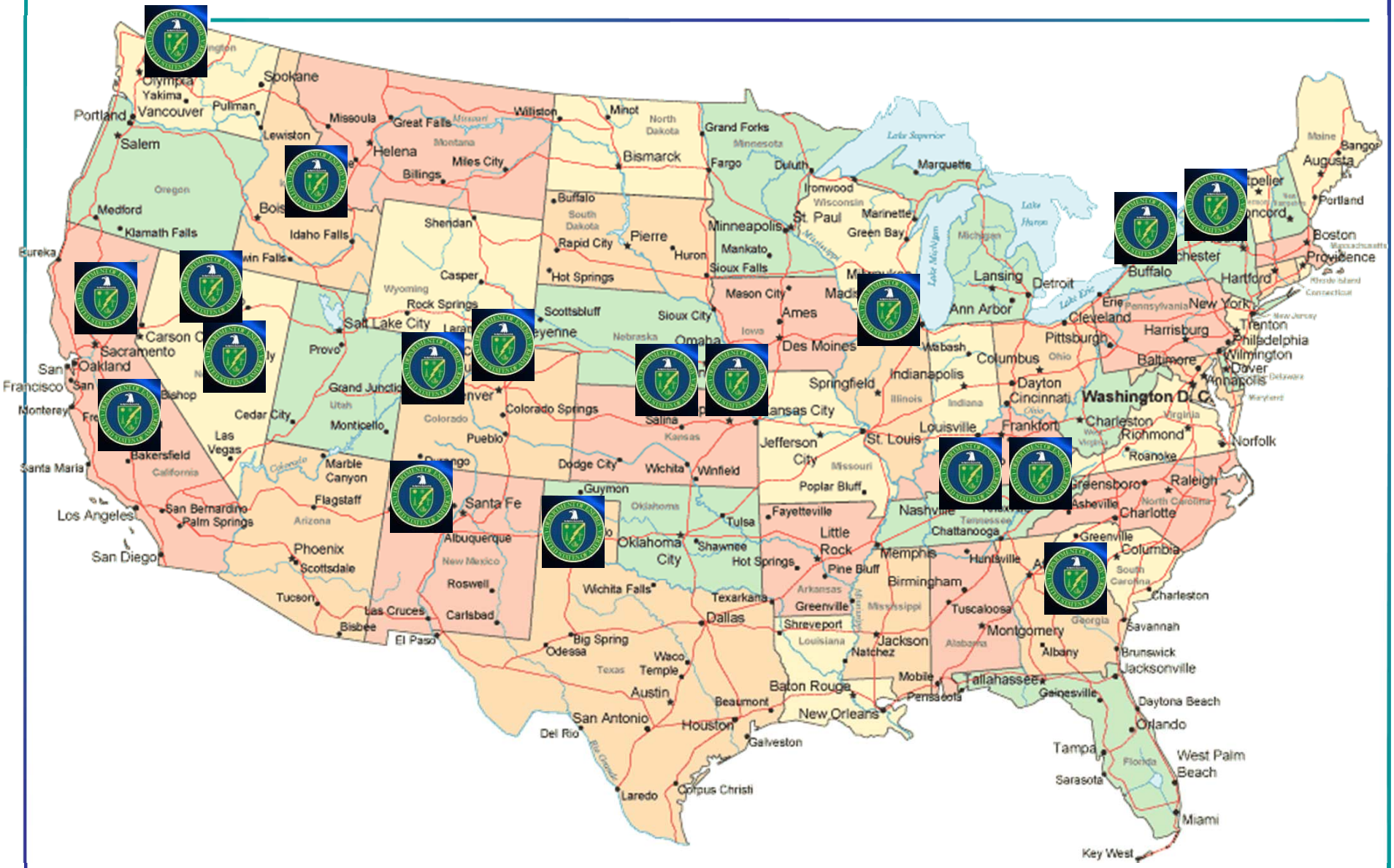
DOE Accredited Sites



Evaluates laboratories performing radiological and non-radiological environmental testing

- Mixed analytes in real world matrices traceable to NIST
- Acceptance criteria based on NIST-traceable reference value
  - Organics acceptance criteria uses NELAC criteria
- Performance based evaluation of laboratories

Not a consensus based PE program

Semiannual Performance Testing

In Natural Matrices:

- Water (Groundwater, surface, etc.)
- Soil
- Air Filters
- Vegetation

Containing Mixed Analytes:

- Radiological Analytes (Alpha, Beta, Gamma)
- Inorganic Analytes (Priority Pollutant RCRA & UTS)
- Organic Analytes (Semi-volatile, pesticides)

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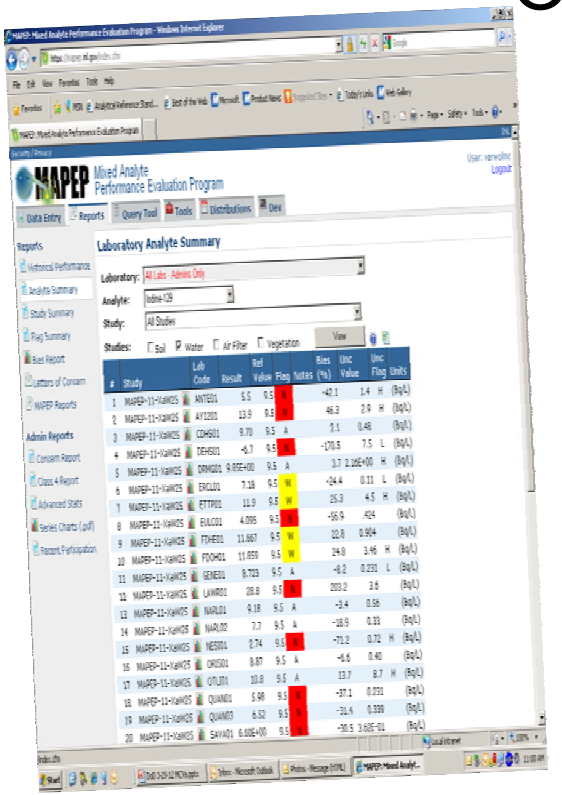
MAPEP Mixed Analyte Performance Evaluation Program



Over 130 national & international participating laboratories

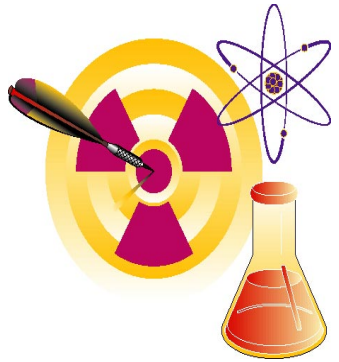
- Results reported over secure web site
- Over 15,000 results are evaluated each year

RESL designed, developed and has administered MAPEP performance testing for over 18 years

Features

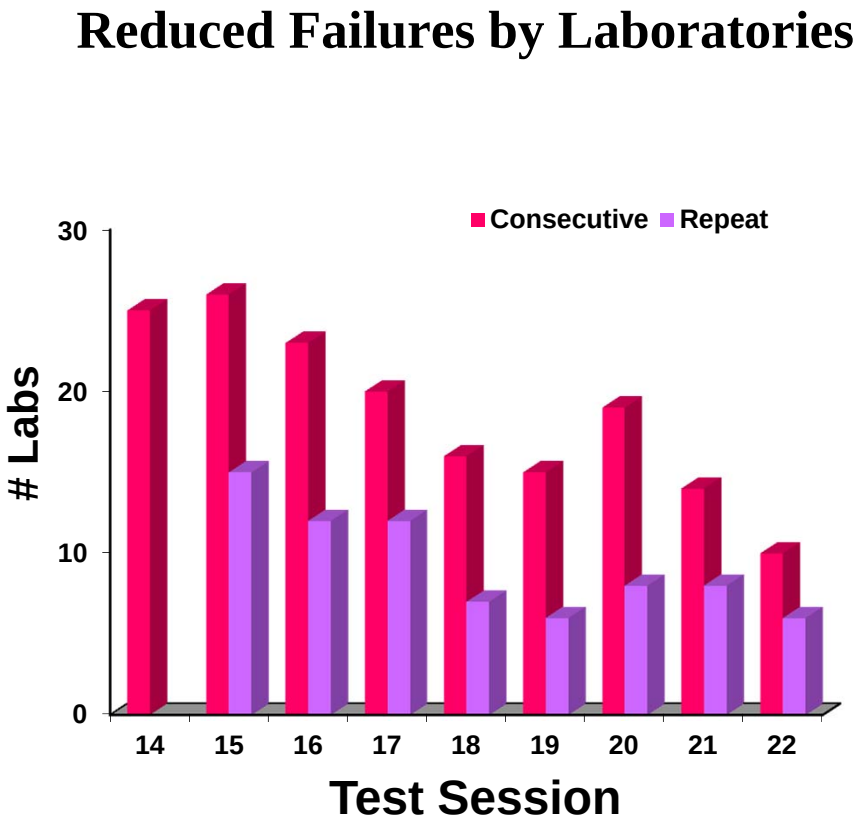
Specialized tests simulate real world samples - challenging laboratories' analytical performance

- False Positive Testing
- Sensitivity/False Negative Testing
- Unique isotopic ratios
- Varying sample matrices and concentrations
- Chemical interferences



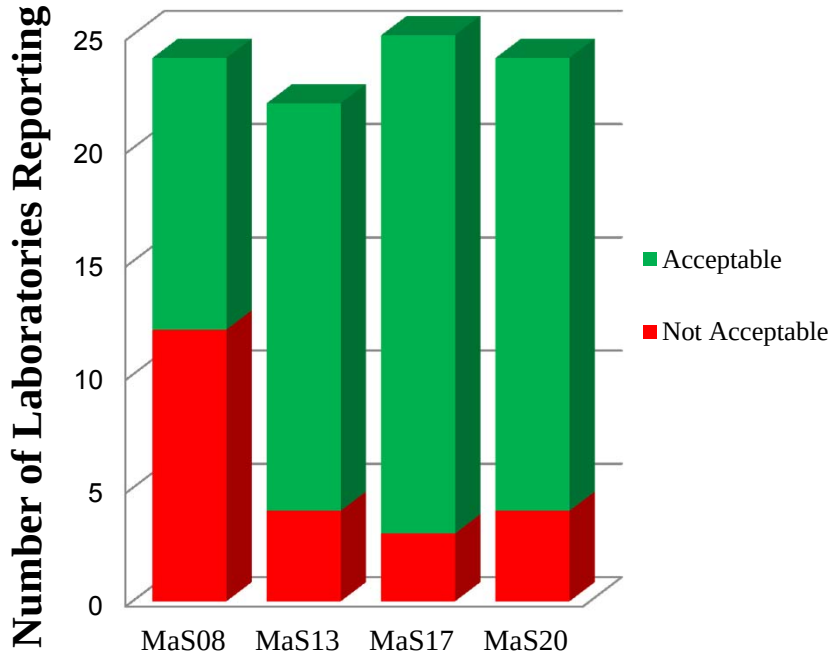
Highlights

Participation improves laboratories performance



Highlights

Selenium in Soil - False Positive Testing
Historical Performance



MAPEP Soils Detection Limit 1.0 mg/kg

Web accessible site

- Participating laboratories report results
- Generate various reports
- Flexible queries of database
- Historical trending of participants

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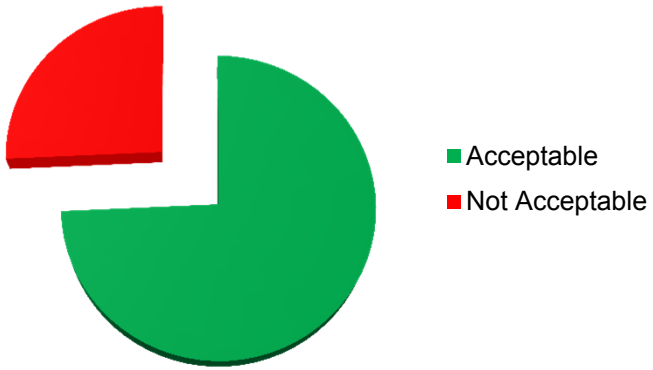
MAPEP Uses Specialized Tests

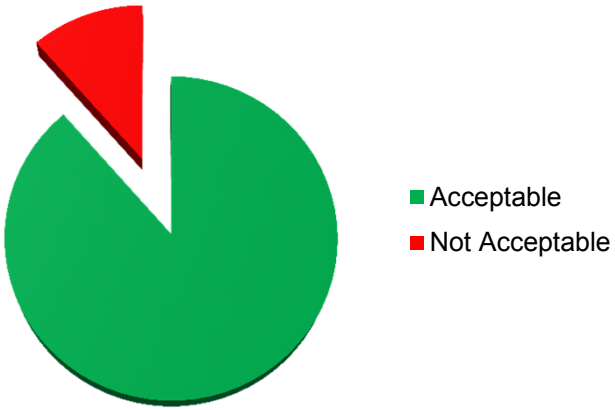
DOE identified refractory plutonium isotopes testing in soil important for laboratories' analytical performance

RESL created MAPEP soil with both refractory and non-refractory Pu in the same soil

Pu-239/240 (Refractory)



Pu-238 (Not Refractory)



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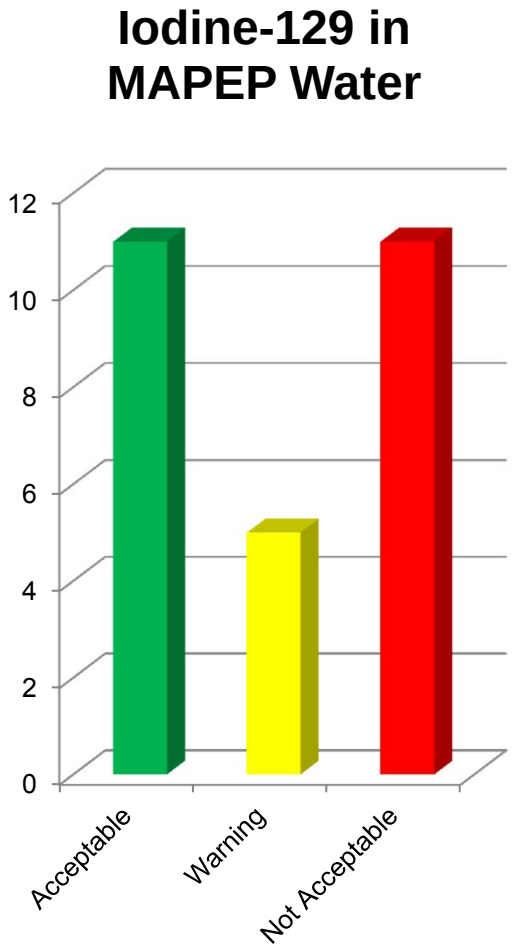
Flexibility to Include Specialized Tests

DOE identified Iodine-129 testing in waters important for laboratories' analytical performance

- ✓ Important long lived isotope to monitor
- ✓ Highly mobile in groundwater
- ✓ Health hazard – concentrates in thyroid
- ✓ No other PT program includes testing for I-129

MAPEP responds by including I-129 in test session 26 showing laboratories relatively poor performance



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Radiological Measurement Assurance Program (RMAP)

RESL evaluates the analytical capability of NRC's contract laboratory

- Performance Evaluation Samples
  - Soil
  - Water
  - Air filters
  - Vegetation
  - Other matrices as requested
- On-site quality assessment

RESL has been NRC's Radiological Reference Laboratory for over 35 years

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Site Specific Performance Evaluation Program (SSPEP)

- RESL prepares proficiency testing standards based on customer requirements for their contracted laboratories
- Performance Evaluation (PE) Samples
  - Soil
  - Water
  - Air filters
  - Fecal
  - Urine
  - Milk
  - Other matrices as requested

- RESL evaluates final results of the PE samples and sends final report to customer

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Examples of RESL Program Specific PEPs

- Produced Air Filters for the IAEA for the Proficiency Test on the Determination of Gamma Emitting Radionuclides in Air Filters IAEA-CU-2006-11
- Ultra Low Level Uranium and Plutonium in excreta samples
- Air Filters for the EMPIRE 2009 and April 2010 radiological exercise
- Air Filters for the IAEA Intercomparisons IAEA-CU-2006 and IAEA-CU-2008
- US ARMY ultra low level depleted uranium in urine
- Collaboration with USDA and FERN

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DOE and DoD Working Together

Currently merging Laboratory Quality Systems Documents

- Opportunity to participate in MAPEP
- Or create a Non-Rad PE program similar to MAPEP

Specifically Address:

- Priority Pollutant Inorganic Analytes
- Semi-Volatile & Pesticide Organic Analytes
- Concentrations similar to real DoD samples
- Incorporate specialized tests and more…..

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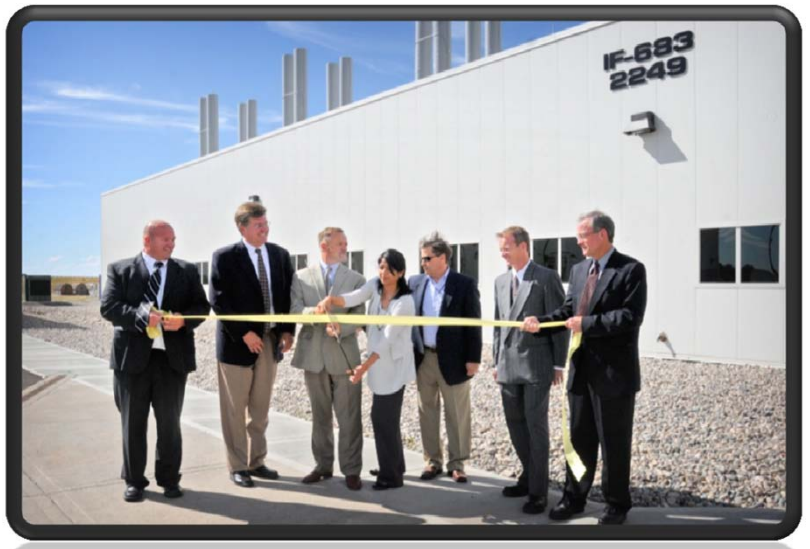
New RESL Facility

- Construction began Spring 2010
- Completed July 2011



- Official Opening August 2011

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New RESL Facility

Lab Area

Office Area

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Renovations Complete

- Ready for occupation